

REMARKS

New Claims 71 - 73 are replacement claims for originally-filed Claims 53 - 55, which referred to the composition of the metal sheets by reference to a trademarked name. Since the composition for each of the trademarked names is called out in Paragraph [0094] (Table 2), applicants have substituted the composition specified in Table 2 for the trademarked name in each of the claims. No new matter has been added to the application, and the scope of the claims has not been broadened by this substitution.

Objection To Amendment Of The Specification In Preliminary Amendment "C":

Applicants' Preliminary Amendment "C", filed May 11, 2006, is objected to under 35 U.S.C. § 132(a) on grounds that Preliminary Amendment "C" introduces new matter into the disclosure. The Examiner cites the introduction of microinches units into the text, where average surface roughness in Ra is recited, as being new matter. However, applicants specified that surface roughness was in accordance with the ASTM 480 BA Standard, and the units for surface roughness in that Standard are in microinches. The Examiner is referred to Paragraph [0078] of the application as originally filed, wherein applicants recite: "In some instances, the metal surfaces may be manufactured with the desired surface roughness, and may need no chemical or mechanical pretreatment prior to diffusion bonding. For example, the ASTM standard for surface roughness for stainless steel sheets (as rolled) is 0.5 Ra to 4.0 Ra (ASTM 480 BA)". This ASTM standard recites surface finishes for sheet stock (of the kind used in the experimental examples provided) under Paragraph 11, "Finish for Sheet". The units specified for the finish of the sheet at page 4, under 11.1.9, are all in micro-inches. A copy of the ASTM Standard Specification A480/A480M-03B is attached for reference by the Examiner.

Further, as previously discussed, it is standard in the sheet metal fabrication industry to express surface roughness in microunits which correspond with the dimensional units for the sheet metal. In the present instance, since all of the sheet metal dimensions are in inches, one of

skill in the art would understand that the surface finish is in microinches. However, to make the claims clearer to one who may not be skilled in the art and who may not be familiar with the ASTM Standard which applies to surface finishes for metal sheet stock, applicants have inserted the microinches units into a portion of the claims and in the specification where needed, for purposes of clarity.

Applicants contend that this does not introduce new matter into the application, since the ASTM Standard Specification for the surface finish was called out, and since the convention for expressing surface finish which is generally used in the art provides that the average surface roughness is in microinches Ra. In support of this contention, applicants are providing herewith a "Declaration Of Mark Crockett Et. Al." under 37 CFR § 1.132. The Declaration is signed by all of the inventors, with the exception of one who was not available at this time.

In view of the above, the Examiner is respectfully requested to withdraw the objection to Applicants' Preliminary Amendment "C" filed May 11, 2006, on grounds that Preliminary Amendment "C" introduces new matter into the disclosure.

Claim Rejections Under 35 U.S.C. § 112, First Paragraph:

Claims 42, 44, 46 - 52, 69, and 70 are rejected under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement. The Examiner suggests that the claims contain subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventors, at the time the application was filed, had possession of the claimed invention. The Examiner cites the presence of the units microinches Ra in Claim 42 with respect to the average surface roughness of the plurality of metal layers which are being diffusion bonded.

Applicants contend that they did have the invention in hand at the time the application was originally filed, and that this is evidenced by the reference to the ASTM Standard Specification for surface finishes for metal sheet stock which shows the units to be in

microinches, as well as for the other reasons provided above with reference to the objection to Preliminary Amendment "C". Again, the inventors have provided a "Declaration Of Mark Crockett Et. Al." under 37 CFR § 1.132, in support of their contention that they had the invention in hand. This is further apparent due to their ability to diffusion bond a plurality of corrosion-resistant metal sheets in the manner described. As discussed subsequently herein, use of metal sheets having a specific surface finish, determined by applicants to enable good diffusion bonding, permitted applicants to diffusion bond corrosion-resistant metal substrates which the prior art indicated could not be diffusion bonded without first coating the mating surfaces of the substrates with a specialized metal alloy.

In view of the arguments presented herein, the Declaration by the inventors, and the ASTM Standard Specification copy (which illustrates that the inventors disclosed that the surface roughness units at the time the application was filed), the Examiner is respectfully requested to withdraw the rejection of Claims 42, 44, 46 - 52, 69, and 70 under 35 U.S.C. § 112, first paragraph, as failing to comply with the written description requirement.

Claim Rejections Under 35 U.S.C. § 103(a):

Claims 42, 44, 46 - 52, 69, and 70 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Craig et al. (U.S. Patent No. 5,686,657). The Craig et al. reference is cited as disclosing a method of preparing a gas distribution assembly which makes use of diffusion bonding of the metal layers. The Examiner refers to Col. 5, lines 50 - 67.

While the Craig et al. reference may recite that the planar manifold which makes up a portion of a gas chromatograph analytical apparatus may be diffusion bonded, the Craig et al. reference is not enabling of applicants' claimed invention, and in fact teaches away from applicants' invention. At Col. 5, lines 50 - 67, the Craig et al. reference teaches: "To illustrate a preferred embodiment of a planar manifold . . . a front plate and a back plate may be seen to be sized and constructed to be superimposed and bonded together during the manufacturing process

... The preferred method of bonding, which generally is known in the art and is described in, for example, U.S. Pat. No. 3,530,568, the disclosure of which is included herein by reference. .
“However, in other embodiments, other materials and bonding methods may be employed”.

No process conditions for diffusion bonding are described in the Craig et al. reference other than the reference to U.S. Patent Number 3,530,568 to Owczarski et al. However, the Owczarski et al. reference teaches away from the present invention, by teaching that diffusion bonding of a corrosion-resistant nickel-based superalloy cannot be accomplished by contacting the surfaces of sheets of the superalloy and following generally known diffusion bonding techniques. The Owczarski et al. reference teaches that it is necessary to apply a nickel-containing interlayer over the mating surfaces of the sheets prior to diffusion bonding, to reduce the formation of precipitation-laden planar joints which have poor mechanical properties.

The Owczarski et al. reference teaches that without the use of such a nickel interlayer (ideally a nickel-cobalt alloy), the joints which were fabricated broke apart during attempts to machine tensile specimens! (Please see Col. 3, lines 26 - 40.) In particular, to solve this problem, the Owczarski et al. reference teaches application of a nickel interlayer (Col. 3, lines 41 - 53), or ideally an interlayer material which is a nickel-cobalt alloy (Col. 4, lines 39 - 40), at the mating surfaces prior to diffusion bonding. At Col. 4, lines 67 - 72, the Owczarski et al. reference teaches that a number of methods are available for plating or coating the surfaces to be joined. The surfaces may be coated by vacuum vapor deposition methods . . . or by electroplating methods. All of the claims in the Owczarski et al. reference recite that the surfaces to be joined are coated with a nickel-containing layer prior to diffusion bonding.

The only diffusion bonding process referenced in Craig et al. teaches away from applicants' invention. Applicants' disclosure does not even suggest that the surface of the plurality of layers to be diffusion bonded must be coated with a layer which facilitates bonding. The Craig et al. reference is not enabling for applicants' diffusion bonding method as described in the present application, and as claimed in Claims 42, 44, 46 - 52. and 69 - 73. “In order to

render a claimed apparatus or method obvious, the prior art must enable one skilled in the art to make and use the apparatus or method” *Rockwell International Corp. v. United States*, 147 F.3d 1358, 47 U.S.P.Q.2d 1027, 1032 (Fed. Cir. 1998). “To be enabling, the specification of the patent must teach those skilled in the art how to make and use the full scope of the claimed invention without undue experimentation” *Durel Corp. v. Osram Sylvania Inc.*, 256 F.3d 1298, 59 U.S.P.Q. 2d 1238, 1244 (Fed. Cir. 2001). In the present instance, the reference(s) cited by the Examiner are not enabling for applicants’ claimed invention and do not render the invention obvious.

Further, the only reference which provides any information with respect to diffusion bonding is the Owczarski et al. reference which teaches away from the present invention, as discussed above. Inventing a method for producing an effective product, in the face of art which strongly suggests that such a method would produce unacceptable results, is the very antithesis of obviousness. *In re Rosenberger and Brandt*, 386 F.2d 1015, 156 U.S.P.Q. 24, 25 (C.C.P.A. 1967). The fact that the prior art contains numerous negative teachings which would have discouraged and deterred a person having ordinary skill in the art from making the invention of the patents in suit is further evidence of non-obviousness. *Mobil Oil Corp. v. W.R. Grace & Co.*, 367 f. Supp. 207, 180 U.S.P.Q. 418, 452 (Conn. 1973). In the present instance, the inventors found a way to obtain diffusion bonding of cleaned, polished sheets of metal having a particular average surface roughness in the face of prior art which said that only a poor bond could be obtained without pre-coating of the metal surfaces with a specialty alloy prior to diffusion bonding. The invention disclosed and claimed by applicants is not obvious in view of the art cited by the Examiner, who has failed to make a *prima facie* case of obviousness.

The Examiner has argued that other recitations called out in applicants’ claims are merely variables which would have been developed as a part of optimization which requires only routine skill in the art. This was not the case, as the inventors developed a combination of variables which produced the desired result. “The Examiner’s failure to indicate any reason for finding

obvious the alteration of the ratio employed in the prior art in the direction and manner claimed renders the rejection untenable". *Ex parte Parthasarathy and Ciapetta*, 174 U.S.P.Q. 63 (PTO Bd. App. 1971). In the present invention, it was not a matter of optimizing variables within known process parameters, it was a matter of finding any process which would work to provide a leak proof bond of corrosion resistant materials. Corrosion resistant materials such as nickel and cobalt containing alloys, by their very nature tend to generate diffusion bonding problems of the kind described in the Owczarski et al. reference at Col. 1, lines 53 - 69, continuing at Col 2, lines 1 - 6. To say that applicants' invention is merely optimization of a known, existing method of diffusion bonding simply is not correct.

In view of the above arguments, the Examiner is respectfully requested to withdraw the rejection of Claims 42, 44, 46 - 52, 69, and 70 under 35 U.S.C. § 103(a) as being unpatentable over Craig et al. (U.S. Patent No. 5,686,657).

Applicants contend that the presently pending claims as amended are in condition for allowance, and the Examiner is respectfully requested to enter the present amendment and to pass the application to allowance.

The Examiner is invited to contact applicants' attorney with any questions or suggestions about amendment of the claims. The telephone number of applicants' attorney is provided below.



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